

TE/Insem.-636
T.E. (Computer Engineering) (Semester-I)
THEORY OF COMPUTATION
(2015 Pattern)

Time : 1 Hour]

[Maximum Marks : 30

Instructions to the candidates:

- 1) Attempt questions Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.

Q1) a) Compare DFA and NFA. [3]

b) Construct a DFA to accept strings of 0's and 1's having at least three consecutive 0's. [3]

c) Construct an equivalent DFA for the following NFA- [4]

States/ Σ	0	1
$\rightarrow p$	{p,q}	{q}
q	{r}	{r}
r	-	{r}

OR

Q2) a) Compare NFA and NFA - ϵ . [3]

b) Construct a Mealy Machine which is equivalent to the Moore Machine given in the following table: [3]

Present State	Next state		Output
	a=0	a=1	
$\rightarrow q_0$	q_3	q_1	0
q_1	q_1	q_2	1
q_2	q_2	q_3	0
q_3	q_3	q_0	0

P.T.O

- Q3) a) Define the following with suitable example [3]
- Regular expression & operations
 - Prove or disprove the following $(rs+tr)^* \vdash r^*(sr+tr)^*$
- Construct the finite Automata defined over $\Sigma = \{0, 1\}$ for the following Regular expression $1(01+10)^* + 0(11+10)^*$ [3]
- c) Using the pumping lemma for the regular set, prove that $L = \{a^i \text{ square} \mid i \geq 1\}$ is not regular. [4]
- OR
- Q4) a) What are the algebraic laws of regular expression. [3]
- Convert the following regular expression to ϵ -NFA, and find the ϵ -closure of all the states. $(0+1)^* \cdot 1 \cdot (0+1)$ [3]
 - Using the pumping lemma for the regular set, prove that $L = \{a^m b^n \mid m \neq n\}$ is not regular. [4]
- Q5) a) Write in brief about "Sentential form" with reference to context free grammar. [3]
- Write equivalent left linear grammar for the following right linear grammar.
 $S \rightarrow 0A$
 $A \rightarrow 10A \mid \epsilon$ [3]
 - Write context free grammar for the following language $0(0+1)^* 01(0+1)^* 1$ [4]

- c) Construct the DFA for the language of all strings that begin and end with same symbol over the alphabet $\Sigma = \{0, 1\}$. [4]



- Q6) a) Eliminate ϵ -productions from the grammar G [3]
- OR
- b) Write CFL for following CFG [3]
- $$A \rightarrow ab|bBa$$
- $$B \rightarrow aB|B|\epsilon$$
- c) Write an equivalent left-linear grammar for the right-linear grammar. [4]
- $$S \rightarrow 0A|1B$$
- $$A \rightarrow 0C|1A|0$$
- $$B \rightarrow 1B|1A|1$$
- $$C \rightarrow 0|0A$$